

Tonsillectirpy

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There is, perhaps, no part of the human body which has less reason for its existence than the tonsil. There is no portion of the human body, on the other hand, so definitely and surely a possible portal of entry for disease. It is because of this important but rather negative function that the medical literature has become so huge on this one subject. It offers a direct avenue for the entrance of infection because of its very structure, its location, and lack of an adequate cleansing secretion.

The tonsil is made up of lymphoid tissue. Its comparatively large surface is further enormously increased¹ by its numerous and branching root-like crypts which dip into the substance,² and can neither cleanse themselves nor be cleansed by any antiseptic. Furthermore, these numerous crypts interlace with similar countless branching blood and lymph vessels which enter the tonsil substance from the throat. Infection breaks down the crypt walls³ and contacts blood vessels connecting with the large vessels that flow almost directly into the heart. Lymph vessels, too, communicate almost directly with large venous trunks. Muscles which firmly enclose the tonsil on three sides compress it and probably enhance the possibility of infection entering the blood stream. Infection of the tonsil crypts therefore is not readily extruded, cannot be suctioned out artificially, cannot be destroyed through antisepsis, and is very rapidly absorbed or disseminated into deeper, important structures. Thus far the consensus of medical opinion has been that persistently infected tonsils, especially after a certain age, should be removed.

Fundamentals of Tonsillectomy

Until recently removal of tonsils consisted solely of lateral incision of the throat, deep enough to involve a layer of retrotonsillar tissue which would readily strip or tear or dissect up with the tonsil itself. Tonsil tissue alone cannot be excised without this retrotonsillar layer. The term enucleation as applied to tonsillectomy is a misnomer, since enucleation implies leaving the shell and removing only the kernel (nucleus). Naturally the layer of tissue removed will vary in thickness and content not only with regard to the extent of chronic infection but according to the judgment of the surgeon.

The tissue removed with the tonsil for want of a better name is called the tonsillar capsule. The raw bleeding surface exposed is quite extensive and becomes infected both from the already infected throat and from extension of the tonsillar infection expressed from its crypts by grasping instruments and by manipulation. Infection of the moist surface results in scarring with a tendency to contraction.⁴ An infected cut of the skin will result in a contracting scar, while an abrasion or first degree burn which scabs over without infection results in scarless healing in a relatively short time.

Large opened venous plexuses may result in bleeding which, if unchecked, may lead to shock and death or sepsis by further extension of the infection into the blood stream. Crushing by snare of arteries at the base of the tonsil may produce only temporary occlusion; hemorrhage as late as the sixth or seventh day may ensue. Portions of extruded crypt infection

may be inhaled into deep portions of the lung and cause lung abscess and, perhaps, pneumonia.

The operation itself, in years gone by, has been taken lightly by the majority of physicians and, therefore, by the laity. To the experienced surgeon it is a serious procedure not only because of difficulties which may present themselves but also because of the possibility of an unsatisfactory result. Rarely, the patient may be merely indisposed for a day or two; more frequently, he may be unable to pursue his vocation for a week; too often, a patient has cause to remember a surgical tonsillectomy as one of the ordeals of life. On the part of the physician it may entail simply an examination of the patient, an anesthetic and the operation, with a visit to the patient's room immediately afterward and then again before the patient leaves the hospital — with perhaps an examination some weeks later. Sometimes, however, it may mean one of the most disagreeable experiences in a professional man's life. If, as very frequently happens following the average surgical tonsillectomy, excision is incomplete,⁵⁻⁶⁻⁷ the physician may be perfectly willing to reoperate, but reoperation will seldom remove a deep disappointment on the part of the patient, who may reject such service to seek aid elsewhere.

Cost is frequently a deciding factor as to the amount of care exercised in performing any service. The improper rating of surgical tonsillectomy as a minor operation cheapens it in the eyes of the laity.

Remnants, more or less, even in the presence of joint or heart manifestations are too often considered an incident; to the careful examiner they are sufficient indication for a general anesthetic and a careful dissection.

Despite the above truisms, entirely obvious to the otolaryngologist, only one other method has ever been seriously considered to supersede tonsillectomy. The severest adverse criticism has come from those who admit an inability to remove all tonsillar tissue. Every specialist, however, in advocating the new method in the removal of tonsillar remnants and tags, has admitted a fact which cannot be refuted — that despite all difficulties, successful removal of tonsillar tissue by electrocoagulation leaves more of the throat in a normal condition than is attainable by any other method. It is really tonsillectirpy.

Advantages of Electrocoagulation

The advantages of electrocoagulation are:

1. Only tonsillar tissue is removed.
2. The so-called capsule remains undisturbed, the tissue beneath non-traumatized, the pillars elastic and soft and undiminished in size, even after many years.
3. The coagulated tissue acts as a scab, the best covering yet devised. Beneath it healing occurs without infection and therefore without scarring.
4. No venous plexuses are opened for bleeding or dissemination of infection.
5. Any liquefaction or separation is practically sterile or contains only saprophytic bacteria, and is not complete until the tenth day.
6. There is no loss of time from work or of a single meal.
7. Fifteen minutes are consumed at each sitting — a total of three and one-half hours or less and that as office procedures. The patient, at each sitting, is fully recovered from the previous treatment.
8. The patient returns willingly for examination at any future time and any remnant may be discovered and cared for without special effort.
9. The method is considered by the patient a refined method. It is suitable where the throat should receive the best of attention as in singers, asthenics or neurotics. If it is suitable in the dangerous, difficult cases,

it is doubly safe in the simple ones.

10. There need be left no remnants under patient, persistent effort. The best results of a successful electrocoagulation are theoretically and practically unattainable by any other surgical procedure.

In reviewing recent articles on the subject of electrocoagulation of tonsils one is impressed with the gradual elimination of a number of objections to the method which previously had seemed insurmountable. Today the one outstanding difficulty is exactly the one which is especially evident followed surgical tonsillectomy — the danger of portions of tonsil remaining in the upper and lower angles of the tonsillar fasso. The objections raised in the order of their frequency are: Incomplete removal, frequency of sittings, bleeding, pain — immediate and operative, swelling.

Incomplete removal of tonsils by electrocoagulation is surely not due to inadequacy of the agent because the diathermy current is a powerful agent capable of removing any amount of tissue. It is adjustable to any desired strength, so that the coagulating effect is under absolute control.

The wide applicability of the coagulating current with success is adequately demonstrated by Strauss⁸ with five and seven year cures in inoperable cancer of the rectum and by numerous workers in such delicate procedures as the repair of detachment of the retina.⁹⁻¹⁰ Until recently the inadequacy of tonsil coagulation, then, has chiefly been due to the inability of the patient to withstand a definite amount of treatment. It is still due in great measure to faulty technic on the part of the operator.

Local Analgesia

Pain has been the chief handicap not so much during treatment since cocaineization permits an adequate degree of coagulation, but postoperatively. I have used most of the local anesthetics in tonsil coagulation during the past nine years. A number of them are sufficiently effective for adequate treatment without too much immediate pain, but postoperative pain ensues too soon and is usually severe. The injection of aqueous solutions results in severe postoperative pain due to the rapid absorption of the anesthetic, and the scalding effect in distant tissue through heat transmission by the injected water.

The absorption of the anesthetic can be immensely retarded through the use of sesame or sweet almond oil as a solvent, but as the amount injected must be scattered in drops only, much time elapses before operative procedure may begin. The dispersion of heat may also be limited by the use of oil but not nearly as well as, by the coagulated serum alone, which acts as an efficient insulator under topical anesthesia.

Fortunately new topical anesthetics have appeared which not only permit of extended coagulation at a sitting but insure a remarkable degree of comfort for the patient even for three days after coagulation. Butesin in carbitol is effective and gives a far better postoperative effect than cocaine. Its action, however, vanishes after about thirty-six hours; while the carbitol is destructive to instruments of hard or soft rubber. Benzocaine has an action similar to butesin but is, perhaps, more irritating to tissue. Eucupin is an effective and safe anesthetic but of short duration.

The most valuable topical anesthetic thus far has proved to be diothane.¹¹ Since December, 1934, I have used it as a 5 per cent solution with benzyl alcohol (5 per cent) in ethyl alcohol (55 per cent) as a solvent. Recently I have used diothane (5 per cent) benzyl alcohol (20 per cent) in propylene glycol. Either one of these diothane solutions give a postoperative anesthesia of even three days duration, which is especially gratifying to patients who have previous had only cocaine as a topical anesthetic. Its action is

slow and about ten to twelve minutes should elapse before coagulation is started. Twenty to thirty drops on a watch crystal or water color plate suffice if the same applicator is used in four or five applications to one side. The anesthetic should be gently rubbed on all parts of the pillars and tonsil. It is non-toxic and causes no perceptible irritation or redness. No patient so anesthetized has ever missed a day at work or a single regular meal even after extensive coagulation of massive tonsils. Adrenalin or ephedrine should not be used as these drugs prevent the penetration and efficacy of the anesthetic.

Technic of Electrocoagulation

A certain technic has been found to be essential. Coagulation should proceed from above downward so that in the average tonsil the upper third is treated, then the middle third at a subsequent treatment and only in the final treatment the very base of the tonsil. Such a procedure insures total removal and prevents bleeding. If one attacks the bulk of the tonsil a crater is formed leaving a shell of tonsil on both anterior and posterior pillars difficult to define and appearing like a score of small tonsils which can be removed piecemeal only. One cannot do a clean surgical dissection in this manner. If coagulation proceeds first along the upper plica to free the tonsil, as in tonsillectomy, and to coagulate as much as possible of the dome extending into the supra-tonsillar fossa, a more definite idea of the size and depth of the tonsil is obtained at the following sitting. Subsequent treatment not only takes care of the next portion but also is directed as a "mopping up process" to any tissues left in the previously treated area. It is absolutely essential that any plica present be removed in order to insure a clean result, since tonsil tissue dips deeply beneath it. Because there will be no shrinkage of tissue, the plica, if left, is frequently so large as not only to prevent a good view of the fossa but to leave a suspiciously ragged appearance. Since the plica is part of the pillar and therefore of the throat,¹² its removal is more painful than that of the tonsil tissue itself, just as in dental procedures the lip, cheek or tongue are much more sensitive to accidental trauma than the gums. The base of the tonsil at the site of its main blood and nerve supply is the most sensitive.

Postoperative bleeding has been a frequent objection. It occurs most frequently on the sixth to the eighth day and especially when a large portion of the base of the tonsil is coagulated. Partial occlusion of an artery leads to atrophy of the tissue it supplies. The atrophy is proportionate to the cross area occluded in the artery. Conversely removal of tissue causes a proportional diminution of the sectional area of an artery. If the base of the tonsil is coagulated only after the upper two-thirds to three-fourths of the tonsil is coagulated, there will never be any bleeding other than the brief oozing similar to that which follows the removal of a small scab from an abrasion. This is my experience in over six hundred cases. An occasional large artery in the middle lateral wall of the fossa may ooze after the second coagulation, that is of the middle third. No matter what the extent of coagulation, ten days time exactly is required for complete liquefaction and disappearance of the coagulum, final separation taking place only at the junction of the living and the coagulated tissue. Therefore two weeks should elapse between treatments on the same side. By treating alternate sides, a treatment may be given every week with only half the amount of discomfort.

Retraction of the pillar to ensure direct vision is as essential as in surgical work elsewhere. Gentleness and calm, deliberate handling of the throat and patient are prime requisites. Swelling of the proximal portion of the palate or of the uvula should only occur when the tonsil extends well up

over the posterior pillar to a short palatal arch. In my experience with minimal amperage and touching only tonsil or lymphoid tissue, swelling is very rare. Too small a current requires longer time for coagulation with resulting dispersion of the heat to remote unanesthetized tissue and needless pain. The optimal time required for each contact is about one second. This depends to some extent on the spread of the points of the electrode—when closely approximated coagulation is localized and rapid; when separated coagulation is more extensive and slower. The duoterminal electrode¹³ requires less current, approximately one-half of that when the uniterminal electrode is used with the indifferent plate or autocondensation cushion. Work is much more rapid with the duoterminal electrode for the same reason that a chisel or gouge is more efficient in wood carving than a single point instrument, like an ice-pick. Pain, too, is less and the danger of coagulation or over-coagulation beyond the desired area is impossible since coagulation always extends beyond the sides and tips of the electrode, one-half the distance of their spread. Prolonging the current beyond coagulation results in a volatilization of the fluid in the coagulated tissue with an explosive effect between the electrode points but without added pain or any harm. The duoterminal electrode is therefore quite self-limiting in effect.

The postoperative condition of the fossa and pillars is remarkably free of thickening or infiltration. The pillars remain soft, elastic and undiminished in size even after six years. The fossa itself in no way resembles that following surgical tonsillectomy and in young individuals not too chronically infected, has the color of the posterior pharynx rather than the grey shining glazed appearance that follows surgery. In the very large and chronically infected tonsil of the adult where extensive outgrowths of fibrous septa reach into the tonsil between the crypts, coagulation leaves stump-like projections in the fossa with possible tonsil islands between them. Removal of these islands, however, leaves a surprisingly smooth floor with occasional firmer small areas more resistant to pressure than the surrounding tissue. Especially in the cases which previously have had peritonsillar abscess, any tonsillar tissue left in the upper poles may result, as after surgical tonsillectomy, in a recurrent abscess.

The favorable immunizing effect of the coagulated bacterial content of the crypts, first observed by Balmer, has been reported by careful observers.^{14, 15} One can demonstrate this effect in cases of acute rheumatic fever, as I have done in three cases by simply coagulating the tonsils on both sides. The regression of symptoms is startling and almost immediate without the aid of any other therapeutic agent. In rapidly progressive, early osteoarthritis, where all dental foci have been removed, but the tonsils overlooked or incompletely removed surgically, the marked regression of symptoms following thorough coagulation can be often noted week by week. Strauss⁸ states that never before, following any other method of treatment in cancer of the rectum, has he seen such marked rapid improvement in a patient's condition as after a single rectal electrocoagulation. Patients with Vincent's angina, who are unable to sleep for several nights and able to eat only with difficulty, obtain immediate relief and a rapid uneventful recovery following a single coagulation of a chronic ulcerated area.

The plea is for (1) further development of topical anesthesia to insure at each sitting a careful, leisurely planned, destruction of a definite portion of the tonsil. (2) Further study by the specialist in the use of a powerful agent possible of accurate control instead of the abuse of the same agent by osteopath, chiropractor and yes, even as in a case brought to my attention, a chiropodist.

For the removal of postoperative remnants and for patients who are

deemed poor surgical risks, electrocoagulation is generally considered advisable. My experience leads me to recognize two types of patients in whom electrocoagulation of tonsils is relatively contraindicated.

1. In the individual above middle age with huge tonsils and no control over gagging and no inclination to cooperate. He should take his chance with a general anesthetic and surgical tonsillectomy.

2. In the patient under fifteen years of age, unless blessed with a fine home background and a certain confidence in the operator. I have successfully coagulated tonsils in a few children twelve years of age.

In conclusion it is pointed out that in the case of the "simple tonsil" the laryngologist can obtain as thorough results with electrocoagulation as the surgeon has attained in cases of cancer of the rectum⁸; can learn to use this method as delicately and accurately as the ophthalmologist in cases of detachment of the retina^{9, 10}; can be as thorough as the urologist in cases of urethral caruncle¹⁶; can reach the so-called "inaccessible" just as deftly as the laryngologist has done in deep laryngeal and bronchial tumors^{17, 18}; can develop a technic of his own—on that can readily leave the tonsillar fossa clean and unscarred—clear of its menacing source of infection—a real tonsillectomy.

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